

Special Problems

12.1 Introduction

There are some problems in natural gas production operations that need to be paid special attentions. One of them is liquid loading of gas production wells, which reduces deliverability of gas wells. Blockage of gas hydrates of pipelines and equipment is another problem that reduces pipeline efficiency and affects normal operations of gas-processing facilities. Yet cleaning pipelines during operation presents a challenging task for engineers in gas-production operations. This chapter addresses these problems and their solutions.

12.2 Liquid Loading on Gas Wells

As shown in Figure 12–1, high-pressure gas wells produce gas carrying liquid water and/or condensate in the form of mist. As the gas flow velocity in the well drops owing to the reservoir pressure depletion, the carrying capacity of the gas decreases. When the gas velocity drops to a critical level, liquids begin to accumulate in the well and the well flow can undergo annular flow regime followed by a slug flow regime. The accumulation of liquids (liquid loading) increases bottom hole pressure that reduces gas production rate. Low gas production rate will cause gas velocity to drop further. Eventually the well will undergo bubbly flow regime and cease producing.

Liquid loading is not always obvious and recognizing the liquid loading problem is not an easy task. A thorough diagnostic analysis of well data needs to be performed. The symptoms to look for include onset of liquid slugs at the surface of the well, increasing difference between the tubing and casing pressures with time, sharp changes in gradient on a flowing